9.0
ALTERNATIVES

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9.0 ALTERNATIVES

9.1 INTRODUCTION

In this section of the application, alternatives to the proposed Colusa Power Project (CPP) are discussed and the results of Reliant's evaluation of these alternatives are described. Alternatives were considered by Reliant as part of its project formulation process. Project alternatives, and specifically, evaluation of the No Project alternative, are required by the CEC's regulations so that it can comply with requirements of the California Environmental Quality Act.

The core business objectives of Reliant Energy include the development and operation of merchant power plants. Reliant currently owns and operates approximately 3,800 MW in southern California and approximately 12,500 MW in operation, construction, or advanced development in other regions of the country. Reliant has identified northern California as a desirable region for investment and development of additional generating resources.

As a basis for selecting potential sites in northern California, Reliant established the following criteria by which all sites were evaluated:

- **Proximity to infrastructure** – The site must be located in close proximity to high voltage transmission lines, a high-pressure major gas transmission system, and potential water source(s).

- **Environmental viability** – The site should have few or no environmentally sensitive areas and should allow development with minimal environmental impacts.

- **Minimal impact on surrounding community** – The site should enable the development of a power plant with minimal negative impact on the surrounding community.

- **Compliance with Laws, Ordinances, Regulations, and Standards (LORS)** – The site should provide opportunity for compliance with all LORS.

9.2 ALTERNATIVES CONSIDERED

As part of its evaluation, Reliant considered a broad range of alternatives, including:

- Site Alternatives
- Combined Cycle Plant Configuration Alternatives
- Generation Technology Alternatives
- Water Supply/Cooling System Alternatives
- Transmission Interconnection Alternatives
- Gas Supply Alternatives
- No Project Alternative

In the following sections the alternatives considered and Reliant's conclusions with respect to these alternatives are given. In order, the first alternative evaluated is the "No Project alternative," which is not a Reliant alternative, but an alternative required by regulation.

9.3 NO PROJECT ALTERNATIVE

Denial of this application by the CEC would, in effect, be the No Project alternative. Should this occur, the primary result would be the loss of 500 nominal MW of generating capacity to provide energy to the State of California.

Were the No Project alternative to result, the following environmental changes would not occur:

- Approximately 29.1 acres of land would remain grassland.
- Approximately 14.5 acres of land would remain undisturbed from the installation of underground pipelines, transmission facilities, and access road.
- The Teresa Creek Bridge would remain in its current condition and would not be upgraded by Reliant.
- Approximately 300 acre-feet of existing water would remain allocated to GCID.
- Colusa County would forego approximately $3.4 million in annual tax revenue.
- Land uses, habitat values, ambient noise, landform, and visual quality of the area would remain unchanged.

The consequences of the No Project alternative include the following:

Loss of generating capacity to serve California load – The State of California is in the midst of an energy supply shortfall to meet existing and future electrical loads.

The supply shortfall is considered a state emergency and has resulted in governmental initiatives to bring on line new generating capacity. Power plants that have recently been approved by the CEC will take approximately 2 years to construct and test for operation. Those that have been recently approved are not expected to completely resolve the state energy crisis. The No Project alternative would eliminate a source of 500 MW of reliable energy supply that is needed to alleviate the shortfall in generating capacity and ease the energy crisis in California.

Increase in energy conversion efficiency would not occur – As a gas turbine combined cycle generating facility, the proposed CPP will be one of the most efficient generating facilities in the state. Its highly efficient energy conversion capability (natural gas to electricity) will produce less air emissions and other environmental effects per kilowatt hour of energy produced than most of the power plants that are currently operating and those that are being constructed on an expedited basis to provide immediate power to the state. When in operation, the CPP would incrementally increase the state's average energy conversion efficiency. Under the No Project alternative, the increase in efficiency would not be realized because less efficient older and peaking plants would run more hours of the year.

Reduction in local air emissions would not occur – A key element of the CPP is the air pollutant offsets required by regulation. Project emissions of nitrogen oxides, NO_X, VOC, and PM_{10} will be offset in equal or greater amounts. One potential source of the offsets could be the two existing fossil fueled turbines at the nearby PG&E Compressor Station. These gas turbines could be idled in favor of an electric motor, eliminating the majority of their air pollutant emissions. In addition, or in some combination with the PG&E Compressor Station emission reductions, the CPP may purchase air pollutant emission offsets in the form of reductions in agricultural burning emissions or in the form of existing emission reduction credits (ERCs) from the ERC bank available on the open market. ERCs most likely would be acquired from local sources wherever possible.

These emissions reductions will result in a net air quality benefit.

9.4 SITE ALTERNATIVES

The site selection criteria described in Section 9.1 were applied to the analysis of alternative sites in predominately rural Colusa County. For purposes of developing potential alternatives, two clusters of potential site locations that could potentially meet the overall objectives of the CPP were evaluated. The first group consists of potential sites located along the I-5 corridor, and the second group consists of potential sites within the 4,800-acre Holthouse Ranch. To assist in evaluation of potential alternative

sites, an extensive evaluation of alternative sites previously prepared by the CEC for the Sacramento Ethanol and Power Cogeneration Project[1] was consulted.

9.4.1 I-5 CORRIDOR GROUP

The area along the I-5 corridor is currently zoned industrial by the county and would comply with Reliant's criteria of complying with all LORS, including local land use and zoning consistency. The area of industrially designated land is confined to a narrow strip adjacent to I-5. These areas do not contain the required high voltage transmission and high pressure gas pipeline infrastructure that is generally located 4 to 5 miles to the west of I-5. Because they lacked infrastructure and would be highly visible to travelers along the interstate, sites in this area were determined to be much less suitable for development than sites to the west located directly adjacent to the transmission line and gas pipeline. After review, sites in the industrial zone were deemed not adequate due to the lack of infrastructure and proximity to local communities.

Additionally, potential sites located nearer to the PGT/PG&E pipeline and the PG&E transmission line corridors were identified for a screening level analysis. Since the CPP project site has been designed such that construction and operation of the CPP will not result in any significant unmitigated environmental impacts, further analyses of these potential sites were not warranted.

9.4.2 HOLTHOUSE RANCH GROUP

Reliant learned that the owner of the Holthouse Ranch was interested in making a portion of the 4,800-acre ranch in Colusa County available for power plant development. Sites within the Holthouse Ranch met the objectives of the CPP.

Alternative site locations within the 4,800 acres were evaluated to develop the final project site area (approximately 200 acres). In determining which portion of the Holthouse Ranch would best meet the project objectives and comply with the site selection criteria, a screening level analysis was performed. In an effort to identify an area within the northern portion of the Holthouse property that would be leased for the development of the Colusa Power Plant, Foothills & Associates, a Sacramento-based environmental consulting firm, was dispatched to perform a biological analysis. In conducting this analysis, a Foothills consultant, along with two Reliant biologists, conducted field visits in effort to identify environmentally sensitive areas to be avoided. Additionally, two engineers from Sargent & Lundy and one Reliant engineer performed a site visit looking for areas that were most suitable from an engineering and construction perspective. Once these two surveys were concluded and evaluated, the current 200-acre site was identified as the best location to develop.

Shortly afterwards, Reliant engaged URS and Duke/Fluor Daniel to conduct the next level of due diligence and identify the actual footprint of the Colusa Power Plant. In performing this analysis both firms, in conjunction with Reliant, studied the 200-acre site in greater detail. The southern portion of the 200 acres was preferred due to the absence of biologically sensitive areas which are present in the northeastern area of the 200 acres. The CPP has been situated at the southerly end of the 200-acre project site, illustrated in Figure 3.3-1. In selecting the south side location, the following design and environmental considerations and constraints were the primary drivers.

- Minimize the length of linear interconnections, including fuel gas, water lines, and site access. Specifically, the distance to the PG&E Compressor Station and to its access road were minimized.

[1] Sacramento Ethanol and Power Cogeneration Project (SEPCO), Final Staff Assessment, November 1993. CEC Staff recommended that although some of the alternative sites evaluated may offer some environmental benefits, they were not preferable to the SEPCO site because the SEPCO site did not result in any unmitigated significant environmental impacts.

- Site Grading and Drainage – the plant topography was evaluated for minimization of the balanced cut and fill quantities, avoidance of flooding concerns, potential viewshed impacts, and geotechnical considerations. The drainage plan incorporates a sedimentation/detention pond for storm water management and erosion control.

- Biologically Sensitive Areas – the plant's permanent and temporary facilities are located to avoid two biologically sensitive areas, and to avoid potential wetland impacts. The southwestern corner and the northern portion of the site are potential habitats for rare plants; the northern end also contains vernal pools.

9.5 GENERATION TECHNOLOGY AND CONFIGURATION ALTERNATIVES

The CPP is planned as a "merchant power plant" to supply energy to the California market. To operate as a merchant power plant, the CPP must be able to cycle load as the market needs during some portions of the year and be able to operate for extended periods of time at other times of the year. Selection of generation technology is influenced in some ways by the intended use of the CPP. Generation technologies that are generally considered include:

- Fossil fueled/steam electric (gas turbine, conventional boiler fueled by natural gas, distillate or coal)
- Nuclear
- Solar
- Biomass
- Hydroelectric
- Wind

Fossil – An evaluation of fossil generation technology necessarily involves consideration of both generation technology and fuel alternatives. Technology alternatives include combustion turbine-generation (both simple and combined cycle) and conventional boilers. Fuel alternatives include natural gas, coal, and distillate. Of the fuel alternatives, natural gas, with its lower sulfur dioxide, and particulate emissions is the preferable fossil fuel for use in California. Both state and local air district air permitting regulations discourage the use of coal. Distillate fuels are also discouraged for units that are designed to run more than a limited number of hours per year.

Nuclear – Nuclear generation was not considered by Reliant to be a feasible technology because of the associated long lead time and high initial capital cost. No new nuclear power plants have been constructed in California since Diablo Canyon and little of the engineering and construction industry capacity required for this technology is available at the current time. Furthermore, it would take on the order of 3 to 5 years to permit such a facility, and a similar amount of time for construction. In addition, the State of California has a moratorium on the construction of any new nuclear facilities until a licensed permanent waste disposal facility is in operation.

Solar – Solar technology is most appropriate as a demand reduction technology. When operated to supply individual energy users, it reduces the amount of energy required from the electrical grid. However, it cannot be controlled by a central system operation that increases/decreases facility output in response to systemwide energy demand. Also, since this technology does not operate at night and at the scale of a "merchant" plant, it was not considered by Reliant to be a feasible technology for the CPP.

Biomass – Biomass technology is similar to conventional boiler facilities but is generally limited to a much smaller project size (on the order of 50 to 100 MW) and has lower thermal conversion efficiency. In addition, consistently available fuel supplies of sufficient quality have been a factor in the operation of

biomass facilities. Because of size and efficiency limitation, biomass technology was not selected by Reliant.

Hydroelectric – Hydroelectric technology was determined by Reliant to be infeasible for a merchant plant operation because of the extensive time such a project would take. A significant obstacle to development of a privately initiated hydroelectric facility is acquisition of land. In addition, the environmental review and approval process for a new hydroelectric project of similar scale to the proposed CPP could take from 5 to 6 years. Construction could take several more years. Such a project would not come on line for 8 or more years. Such long lead times and the uncertainty of the licensing process make this technology infeasible to Reliant as a technology alternative.

Wind – Wind energy was not considered to be a feasible technology for a merchant plant for several reasons. Wind energy is not always available; this technology is characterized by a low average capacity factor. It also requires significant land area and the installation of a large number of individual machines to form a significant amount of generating capacity in aggregate. With these characteristics, wind energy was rejected by Reliant as a feasible technology alternative.

In addition to generation technology alternatives, Reliant evaluated the following plant configurations and maximum output:

- 1,000 MW Combined Cycle Plant – A plant of this size would have employed two 2×1 gas/steam turbine configurations.
- 930 MW Combined Cycle Plant – This plant configuration would have consisted of a 3×1 gas/steam turbine combination.
- 500 MW Combined Cycle Plant – This plant, which was ultimately chosen, uses a 2×1 gas/steam turbine configuration.
- 350 MW Simple Cycle Plant – A simple cycle configuration was evaluated by Reliant.

During the evaluation stage of Reliant's development process, both the 1,000 MW and 930 MW plants were ruled out as viable options due to transmission constraints. The simple cycle plant was not chosen by Reliant due to the economics associated with a peaking facility in northern California, which include less efficient fuel use and other economic considerations.

9.6 WATER SUPPLY/COOLING SYSTEM ALTERNATIVES

The consideration of power plant water supply includes consideration of water requirements to meet process needs and the availability of alternative water supplies. Power plant water requirements, other than for general maintenance and personnel needs, are related to cooling and to the steam cycle. All of the generation technologies that include a steam cycle (generation of steam to drive a steam turbine generator) require water for steam generation. A heat transfer medium is also required to condense the low-quality steam at the end of the cycle. Two methods of steam condensing are typically used: circulating cooling water through a condenser, and direct condensation of the steam in an air-cooled condenser. The use of a circulating cooling water system entails the use of cooling towers, which can have a significant impact on plant water requirements.

Cooling system alternatives that are available range from wet cooling towers to air cooled condensers (dry system). An intermediate alternative is a hybrid system that incorporates is a portion of both the wet and dry technology. Since wet towers and an air-cooled condenser (ACC) system represent the extremes in water requirements these two cooling system alternatives were evaluated by Reliant. A comparison of the general features of these two systems shows:

- Installed costs for the ACC are significantly more than for a wet cooling tower.

- When using an ACC, plant output is less than when using a wet cooling tower.
- Water requirements for the ACC can be on the order of 3,500 acre-feet per year less than the wet cooling tower.

Reliant selected the ACC for steam condensing. Despite higher capital costs and impacts on plant output, Reliant determined that the reduced water requirements of the ACC were critical to development of the proposed site.

To obtain water to meet plant water requirements, three types of supply sources were considered: municipal supplies, groundwater reservoirs, and surface water sources.

The nearest developed water supply system is in Maxwell, approximately 7 miles south of the site. However, due to distance and limited capacity, use of this system was determined not to be feasible. Groundwater availability in the vicinity of the plant site may not be as reliable as available surface water sources. Three test wells were drilled on site and tested. The test program, detailed in Appendix O and summarized in Section 8.14.1.1, suggested that a potential yield of about 200 gpm might be available from one onsite location. Because of the uncertainty about whether a reliable source of sufficient groundwater is available to meet the proposed project's water supply needs, use of groundwater as the sole or primary water supply source was determined to be less reliable than a surface water source.

The Glenn-Colusa Canal and the Tehama-Colusa Canal are proximate to the site. The proposed project's water requirements of approximately 300 acre-feet per year would be (including a factor of safety) a small proportion of the water flowing through these systems, as described above. Existing water allocations to the Glenn-Colusa Canal are only subject to a maximum curtailment of 25 percent. Numerous water districts along the Tehama-Colusa Canal receive water from the U.S. Bureau of Reclamation. This water is subject to unlimited curtailment. Based on these considerations, a water supply from the Glenn-Colusa Canal's Central Valley Project water allotment best met the needs of the proposed project.

Because of sensitive biological resources west of the Glenn-Colusa Canal and the habitat provided by the canal itself, a water delivery method limiting adverse effects to this canal was investigated. Because of an existing wheeling agreement between the Glenn-Colusa Irrigation District (GCID) and the Tehama-Colusa Canal Authority (TCCA), water can easily be supplied by the GCID, wheeled to the TCCA, and extracted from the Tehama-Colusa Canal. The benefits of this method of delivery over construction of a pipeline from the GCID canal to the site include avoidance of sensitive biological resources including wetlands and vernal pools, avoidance of giant garter snake habitat, and avoidance of disturbance to a canal that feeds directly into the Sacramento River. Because the Tehama-Colusa Canal is a concrete-lined structure, it does not provide habitat for sensitive species, and the water supply pipeline route can be located to avoid sensitive species.

9.7 TRANSMISSION SYSTEM ALTERNATIVES

The proposed project site (the facility location, as opposed to the general site) is located approximately 1,800 feet (1/3 mile) from PG&E's 230 kV transmission system from Cottonwood to Vaca-Dixon. To the west and farther away from the proposed site is the California-Oregon Transmission Project (COTP) transmission line, which operates at 500 kV. The nearest electrical substation that provides opportunity for interconnection is located at Maxwell and is a distribution substation.

There are only two alternatives for interconnection of the CPP to the transmission grid to provide a path for export of power from the facility: construction of a new transmission interconnection to a nearby electrical substation (substation interconnection), or interconnection directly with the PG&E system (direct connection). More specifically:

- **Substation Interconnection** – To implement this alternative would require construction of a new interconnection transmission line from the CPP switchyard to Maxwell located approximately seven miles from the project site. This alternative would require acquisition of approximately seven miles of right-of-way and construction of the interconnection line. This alternative would include disturbance at tower locations, and potential construction of an access road, and would create a new height obstacle to aerial farming operations (aerial spraying) in a predominantly agricultural area.

- **Direct Connection** – To implement this alternative would involve looping PG&E's existing 230 kV transmission into a new switchyard located adjacent to the CPP. PG&E's existing transmission includes two parallel tower lines, each of which carries two 230 kV circuits. To loop each of these circuits into the CPP switchyard and back to the main transmission line route would involve the construction of four tower lines from the existing PG&E transmission corridor to the CPP. Two tower lines are required to bring the existing four circuits into the switchyard and two tower lines are required to return. These tower lines would be approximately 1,800 feet long and constructed in the area between the CPP site and the existing transmission line. Since this connection would be constructed in the confined area between the power plant and the existing transmission line, limited construction of new access would be required.

Reliant selected the direct connection alternative based primarily on two factors:

- Direct Connection required less transmission line construction and therefore less environmental disturbance.

- Substation Interconnection provides a lower level of transmission reliability because it is limited by an outage on the single interconnection circuit. Additional reliability could be provided by a second interconnection, but only at increased cost. Direct Connection through the CPP switchyard allows interconnection to either or both of the major PG&E transmission circuits, offering an increased level of transmission reliability compared to the Substation Interconnection alternative.

It should be noted that direct interconnection to the COTP could also be included as an alternative. This interconnection would be configured in a manner similar to the interconnection to the PG&E transmission line. However, since the COTP line is approximately 1.25 miles to the west of the proposed site, the required loop lines for interconnection would be longer. Because this alternative does not offer superior performance/reliability features, it was rejected in favor of the direct connection to the PG&E system.

9.8 GAS SUPPLY ALTERNATIVES

The proposed project will require approximately 100 million standard cubic feet per day (scf/d) of natural gas for operations. Delivery of gas in this volume requires interconnection to a major gas transmission line or to a local distribution network with sufficient transmission capacity to serve the power plant's needs.

The CPP site is not located in close proximity to any local distribution system from which gas can be obtained. However, it is located less than one-quarter mile from the PGT/PG&E gas transmission line and PG&E's Compressor Station.

The most direct alternative for delivery of gas to the CPP is construction of a pipeline directly to the PG&E Compressor Station and interconnection to the PGT/PG&E system. This alternative would require disturbance of approximately 5.7 acres of land during installation of the pipeline. However, the ground surface in the area would be disturbed for construction of the plant access road, and the area not

permanently used for road access would be restored and surface vegetation would be re-established. Thus, no permanent environmental changes from pipeline construction are expected.

The only other gas pipeline alternatives that could be considered would be alternative routes to interconnect to the PGT/PG&E system. Because the proposed gas pipeline alternative is the most direct route to the compressor station/pipeline, any other alternatives considered would be over a longer route. A longer pipeline route would entail greater construction disturbance and require additional capital investment.